STATEMENT OF WORK FOR MONSANTO CHEMICAL COMPANY
REMEDIAL INVESTIGATION AND FEASIBILITY STUDY

INTRODUCTION

The purpose of this Remedial Investigation/Feasibility Study ("RI/FS") is to investigate the nature and extent of contamination at the Monsanto Chemical Company Soda Springs site ("Site"), the potential risk to human health and the environment, and develop and evaluate potential remedial alternatives. The RI and FS are interactive and may be conducted concurrently so that the data collected in the RI influences the development of remedial alternatives in the FS, which in turn affects the data needs and the scope of treatability studies.

Respondent will conduct this RI/FS and will produce draft RI and FS reports that are in accordance with this statement of work ("SOW"), the Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (U.S. EPA, Office of Emergency and Remedial Response, October 1988), and any other guidances that EPA uses in conducting an RI/FS (a list of the primary guidances is attached), as well as any additional requirements in the Order. The RI/FS Guidance describes the report format and the required report content. The Respondent will furnish all necessary personnel, materials, and services needed, or incidental to, performing the RI/FS, except as otherwise specified in the Order.

At the completion of the RI/FS, EPA will be responsible for the selection of a Site remedy and will document this selection in a Record of Decision ("ROD"). The remedial action alternative selected by EPA will meet the cleanup standards specified in Section 121 of CERCLA, 42 U.S.C. § 9621; i.e., the selected remedial action will be protective of human health and the environment, will be in compliance with, or include a waiver of, applicable or relevant and appropriate requirements of other laws, will be cost effective, will utilize permanent solutions and alternative treatment technologies or resource recovery technologies, to the maximum extent practicable, and will address the statutory preference for treatment as a principal element. The final RI/FS report, as adopted by EPA, and the administrative record, will form the basis for the selection of the remedy for the Site, and will provide the information necessary to support the development of the ROD.

As specified in Section 104(a)(1) of CERCLA, 42 U.S.C. § 9604(a)(1), as amended, EPA will provide oversight of Respondent's activities throughout the RI/FS. Respondent will support EPA's initiation and conduct of activities related to the implementation of oversight activities.

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TASK 1 - SCOPING (RI/FS Guidance, Chapter 2)

Scoping includes the initial planning process of the RI/FS and is initiated by EPA prior to issuing special notice. During the initial phases, Site-specific objectives of the RI/FS, and a general management approach for the Site are determined by EPA. Scoping is therefore initiated prior to negotiations between potentially responsible parties ("PRP"s) and EPA, and is continued, repeated as necessary, and refined throughout the RI/FS process. Consistent with the general management approach, the specific project scope will be planned by Respondent and EPA. Respondent will document the specific project scope in a work plan. Because the work required to perform an RI/FS is not fully known at the onset, and is phased in accordance with the a Site's complexity and the amount of available information, it may be necessary to modify the work plan during the RI/FS to satisfy the objectives of the study.

The objectives for the Site have been determined preliminarily, based on available information. They are to gather additional data of sufficient quantity and quality concerning contaminants in soil and groundwater to conduct a Human Health and Ecological Risk Assessment, to determine extent and transport of contaminants, and to select the most appropriate remedial action by conducting a Feasibility Study.

The strategy for the general management of the Site will include a sampling strategy to be agreed upon by EPA and Respondent which meets the above objectives based on the nature and extent of contamination at the Site. The data generated from the sampling effort will then be used to meet all of the requirements of an RI/FS which are outlined in this Statement of Work.

When scoping the specific aspects of a project, Respondent must meet with EPA to discuss all project planning decisions and special concerns associated with the Site. The following activities shall be performed by Respondent as a function of the project planning process.

a. <u>Site Background</u> (2.2)

Respondent will gather and analyze the existing Site background information to assist in planning the scope of the RI/FS.

<u>Collect and analyze existing data and document the need for additional data</u> (2.2.2; 2.2.6; 2.2.7)

Before planning RI/FS activities, all existing Site data will be thoroughly compiled and reviewed by Respondent, including all presently available data relating to the varieties and quantities of hazardous substances at the Site, and past

disposal practices. This will also include results from any previous sampling events which may have been conducted by Respondent or a third party. Respondent will refer to Table 2-1 of the RI/FS Guidance for a comprehensive list of data collection information sources. The available information will be utilized in determining additional data needed to finish characterizing the Site, better define potential applicable or relevant and appropriate requirements (ARARs), and to develop a range of preliminarily identified remedial alternatives Data Quality Objectives ("DQO"s) which will be established subject to EPA approval. The DQOs will be used to characterize the usefulness and completeness of existing data. Decisions on the DQOs and data needs will be made by EPA.

b. Project Planning (2.2)

Once Respondent has collected and analyzed existing data, the specific project scope will be determined. Project planning activities include those tasks described below as well as identifying data needs, developing any work plan, designing a data collection program, and identifying health and safety protocols. Respondent will meet with EPA regarding the following activities and before the drafting of the scoping deliverables identified in Section c below.

Refine and document preliminary remedial action objectives and alternatives (2.2.3)

Once existing Site information has been analyzed and a conceptual understanding of the potential Site risks is reached, Respondent will review and, if necessary, refine the remedial action objectives that have been identified by EPA for each contaminated medium. The revised remedial action objectives will be documented in a technical memorandum and subject to EPA approval. Respondent will then identify a preliminary range of broadly defined potential remedial action alternatives and associated technologies. The range of potential alternatives should encompass, where appropriate, alternatives in which treatment significantly reduces the toxicity, mobility, or volume of the waste; alternatives which involve containment with little or no treatment; and a no-action alternative.

Document the need for treatability studies (2.2.4)

If remedial actions involving treatment have been identified by Respondent or EPA, treatability studies will be required unless Respondent can demonstrate to EPA's satisfaction that they are not needed. If treatability studies are needed, initial treatability testing activities (such as research and study design) will be planned to occur concurrently with Site

characterization activities (see Tasks 3 and 5).

Begin preliminary identification of Potential ARARs (2.2.5)

Respondent will conduct a preliminary identification of potential state and federal ARARs (chemical-specific, location-specific and action-specific) to assist in the refinement of remedial action objectives, and the initial identification of remedial alternatives and ARARs associated with particular actions. ARAR identification will continue as Site conditions, contaminants, and remedial action alternatives are better defined.

c. Scoping Deliverables (2.3)

After the project planning phase, Respondent will submit a RI/FS work plan, a sampling and analysis plan, ("SAP") and a site health and safety plan. The RI/FS work plan and SAP must be reviewed and approved by EPA prior to the initiation of any field activities.

RI/FS Work Plan (2.3.1)

A work plan documenting the decisions and evaluations completed during the scoping process will be submitted to EPA for review and approval. The work plan should be developed in conjunction with the SAP and the site health and safety plan, although each plan may be delivered under separate cover. The work plan will include: a comprehensive description of the work to be performed, including the methodologies to be utilized; a corresponding schedule for completion, and the rationale for performing all required activities.

Specifically, the work plan will present a statement of the remaining problem(s) and potential problem(s) posed by the Site, and the objectives of the RI/FS. It will include a Site background summary setting forth the Site description including its geographic location, and to the extent possible, a description of its physiography, hydrology, geology, demographics, ecological, cultural and natural resource features; a synopsis of its history and a description of previous responses that have been conducted at the Site by local, state, federal, or private parties; a summary of the existing data in terms of physical and chemical characteristics of the contaminants identified, and their distribution among the environmental media at the Site. Previous studies and information on the Site already submitted to EPA may be incorporated by reference. The plan will also include: a conceptual "model" describing the contaminant sources, and potential migration and exposure pathways and receptors; a description of the Site management strategy

developed by EPA during scoping; a preliminary identification of remedial alternatives and data needs for evaluation of remedial alternatives. It shall also reflect coordination with treatability study requirements (see Tasks 1 and 5); and include a process for and manner of identifying Federal and state ARARs (chemical-specific, location-specific and action-specific).

The major part of the work plan is a detailed description of the tasks to be performed, information needed for each task, information to be produced during and at the conclusion of each task, and a description of the work products that will be submitted to EPA. This includes the deliverables set forth in the remainder of this SOW; a schedule for each of the required activities which is consistent with the RI/FS guidance; and a project management plan, including a data management plan (e.g., requirements for project management systems and software, minimum data requirements, data format and backup data management), monthly reports to EPA and meetings and presentations to EPA at the conclusion of each major phase of the RI/FS. Respondent will refer to Appendix B of the RI/FS Guidance for a more comprehensive description of the contents of the required work plan.

Because of the iterative nature of the RI/FS, additional data requirements and analyses may be identified throughout the process. Respondent will submit a technical memorandum documenting the need for additional data, and identifying the DQOs whenever such requirements are identified. In any event, Respondent is responsible for fulfilling additional data and analysis needs identified by EPA consistent with the general scope and objectives of this RI/FS.

Sampling and Analysis Plan (2.3.2)

Respondent will prepare a sampling and analysis plan ("SAP") to ensure that sample collection and analytical activities are conducted in accordance with technically acceptable protocols, and that the data meet DQOs. The SAP provides a mechanism for planning field activities and consists of a field sampling plan ("FSP") and a quality assurance project plan ("QAPP").

The FSP will define in detail the sampling and data-gathering methods to be used on the project. It will include sampling objectives, sample location and frequency, sampling equipment and procedures, and sample handling and analysis. The QAPP will describe the project objectives and organization, functional activities, and quality assurance and quality control ("QA/QC") protocols to be used to achieve the desired DQOs. The DQOs will, at a minimum, reflect use of analytic methods for identifying contamination and remediating contamination consistent with the levels for remedial action

objectives identified in National Oil and Hazardous Substances Pollution Contingency Plan ("NCP") at 40 CFR Part 300, (March 8, 1990).

The QAPP will address sampling procedures, sample custody, analytical procedures, and data reduction, validation, reporting and personnel qualifications. Field personnel should be available for EPA QA/QC training and orientation where applicable. Respondent will demonstrate in the QAPP that each laboratory it may use is qualified to conduct the proposed work including: use of methods and analytical protocols for the chemicals of concern in the media of interest within detection and quantification limits consistent with both QA/QC procedures and DQOs approved in the QAPP for the Site by EPA. Each laboratory must have, and follow, an approved QA program. If a laboratory not in the Contract Laboratory Program (CLP) is selected, methods consistent with CLP methods must be used. If the laboratory is not in the CLP program, a laboratory QA program must be submitted for EPA review and approval. EPA may require Respondent to submit detailed information to demonstrate that the laboratory is qualified to conduct the work, including information on personnel qualifications, equipment and material specifications. Respondent will provide assurances that EPA has access to laboratory personnel, equipment and records for sample collection, transportation and analysis.

Site Health and Safety Plan (2.3.3)

A health and safety plan will be prepared in conformance with the Respondent's health and safety program, and in compliance with OSHA regulations and protocols. It will include the elements described in the RI/FS Guidance, such as a health and safety risk analysis, a description of monitoring and personal protective equipment, medical monitoring, and Site control. EPA does not "approve" Respondent's health and safety plan. EPA reviews it to ensure all necessary elements are included, and that it provides for the protection of human health and the environment.

TASK 2 - COMMUNITY RELATIONS

The development and implementation of community relations activities are responsibilities of EPA. The critical community relations planning steps performed by EPA include conducting community interviews and developing a community relations plan. Although EPA implements the community relations plan, Respondent may assist by providing information regarding the Site's history, participating in public meetings, or by preparing fact sheets for distribution to the public. EPA shall establish a community information repository, at or near the site, to house a copy of the administrative record. The extent of Respondent's involvement

in community relations activities shall be within the sole discretion of EPA.

TASK 3 - SITE CHARACTERIZATION (RI/FS Guidance, Chapter 3)

As part of the RI, Respondent will perform the activities described in this task, including the preparation of a Site characterization summary and a RI report. The overall objective of Site characterization is to describe areas of the Site which may still pose a threat to human health or the environment. This is accomplished by determining the Site's physiography, geology, and hydrology, defining the surface and subsurface pathways of contaminant migration, identifying any remaining sources of contamination and defining the nature, extent, and volume of these sources, including their physical and chemical constituents as well as their concentrations at incremental locations to background in the affected media. Respondent will also investigate the extent of migration of this contamination and its volume and any changes in its physical or chemical characteristics, to provide for a comprehensive understanding of the nature and extent of contamination at the Site. Contaminant fate and transport shall be determined and projected from this information.

During this phase of the RI/FS, the work plan, SAP, and health and safety plan are implemented. Field data are collected and analyzed to provide the information required to accomplish the objectives of the study. After the above plans have been approved by EPA, Respondent will notify EPA at least two (2) weeks in advance of any field activities, including field lay out of the sampling grid, excavation, installation of wells, initiating sampling, installation and calibration of equipment, pump tests, and initiation of analysis and all other field investigation activities. To satisfy the objectives of the RI/FS, Respondent may have to supplement the work specified in the initial work plan. Respondent will provide a monthly progress report and participate in meetings at major points in the RI/FS, as requested by EPA.

a. Field Investigation (3.2)

The field investigation includes the gathering of any additional data needed to finish defining Site physical characteristics, any remaining sources of contamination, and the nature and extent of contamination at the Site. These activities will be performed by Respondent in accordance with the work plan and SAP. At a minimum, this shall address the following:

Implement and document field support activities (3.2.1)

Respondent will initiate field support activities following approval of the work plan and SAP. Field support activities may include obtaining access to the Site, scheduling, and procuring equipment, office space, laboratory services, and/or

contractors. Respondent will notify EPA at least two (2) weeks prior to initiating field support activities so EPA may adequately schedule oversight tasks. Respondent will also notify EPA in writing upon completion of field support activities.

Investigate and define site physical characteristics (3.2.2)

Respondent will collect data on the physical characteristics of the Site and its surrounding areas including the physiography, geology, and hydrology, and specific physical characteristics identified in the work plan. This information will be ascertained through a combination of physical measurements, observations, and sampling efforts and will be utilized to define potential transport pathways and receptor populations. In defining the Site's physical characteristics Respondent will also obtain sufficient engineering data (such as pumping characteristics) for the projection of contaminant fate and transport, and development and screening of remedial action alternatives, including information to assess treatment technologies. Again, previous studies and information already submitted to EPA may be incorporated by reference.

Define sources of contamination (3.2.3)

Respondent will locate each remaining source of contamination. For each location, the areal extent and depth of contamination will be determined by sampling at incremental depths on a sampling grid. Respondent shall conduct sufficient sampling to define the boundaries of these remaining contaminant sources to the level established in the QA/QC plan and DQOs. Defining the remaining source of contamination will include analyzing the potential for contaminant release (e.g., long term leaching from soil), contaminant mobility and persistence, and characteristics important for evaluating remedial actions, including information to assess treatment technologies.

Describe the nature and extent of contamination (3.2.4)

Respondent will gather any additional information necessary to finish describing the nature and extent of contamination as a final step during the field investigation. Respondent will utilize the information on Site physical characteristics and sources of contamination to give a preliminary estimate of the contaminants that may have migrated. Respondent will then implement an iterative monitoring program and any study program identified in the work plan or SAP, and by using analytical techniques sufficient to detect and quantify the concentration of contaminants, shall determine the migration of contaminants through the various media at the Site. Respondent will also gather data for calculations of

contaminant fate and transport. This process is continued until the area and depth of contamination are known to the level of contamination established in the QA/QC plan and DQOs. Information on the nature and extent of contamination will be utilized to determine the level of risk presented by the Site, and will help to determine aspects of any additional appropriate remedial action alternatives to be evaluated.

b. Data Analyses (3.4)

Evaluate site characteristics (3.4.1)

Respondent will analyze and evaluate the data generated during previous studies and during the Site investigation to describe: (1) Site physical characteristics, (2) any remaining contaminant source characteristics, (3) nature and extent of contamination, and (4) contaminant fate and transport. Results of the Site physical characteristics, source characteristics, and extent of contamination analyses are utilized in the analysis of contaminant fate and transport. The evaluation will include the actual and potential magnitude of releases from the sources, and horizontal and vertical spread of contamination as well as mobility and persistence of contaminants. If modeling is appropriate, such models shall be identified to EPA in a technical memorandum prior to their use. All data and programming, including any proprietary programs, shall be made available to EPA together with a sensitivity analysis in the Preliminary Site Characterization Summary. This evaluation shall provide any information relevant to Site characteristics necessary for evaluation of the need for remedial action, and for the development and evaluation of remedial alternatives. Analyses of data collected for Site characterization will meet the DQOs developed in the QA/QC plan stated in the SAP (or revised during the RI).

c. Data Management Procedures (3.5)

Respondent will consistently document the quality and validity of field and laboratory data compiled during the RI. All groundwater data supplied to EPA must be in strict adherence with the Region 10 Groundwater Data Management Order, R10 7500.1, dated August 15, 1989, a copy of which is attached to this SOW as Attachment 1.

Document field activities (3.5.1)

Information gathered during Site characterization will be consistently documented and adequately recorded by Respondent in well maintained field logs and laboratory reports. The method(s) of documentation must be specified in the work plan and/or the SAP. Field logs must be utilized to document

observations, measurements, and significant events that have occurred during field activities. Laboratory reports must document sample custody, analytical responsibility, analytical results, adherence to prescribed protocols, nonconformity events, corrective measures, and/or data deficiencies.

Maintain sample management and tracking (3.5.2; 3.5.3)

Respondent will maintain field reports, sample shipment records, analytical results, and QA/QC reports to ensure that only validated analytical data are reported and utilized in the development and evaluation of remedial alternatives. Analytical results developed under the work plan will not be included in any Site characterization reports unless accompanied by, or cross-referenced to, a corresponding QA/QC report. Respondent will establish a data security system to safeguard chain-of-custody forms and other project records to prevent loss, damage, or alteration of project documentation.

d. Site Characterization Deliverables (3.7)

Respondent will prepare the preliminary Site characterization summary and, once the baseline risk assessment (Task 4) has been completed by EPA, the remedial investigation report.

Preliminary Site Characterization Summary (3.7.2)

After completing field sampling and analysis, Respondent will prepare a concise Site characterization summary which will review all investigative activities; describe and display Site data documenting the location and characteristics of surface and subsurface features and contamination at the Site, including the affected medium location, types, physical state, concentration and quantity of contaminants. In addition, the location, dimensions, physical condition and varying concentrations of each contaminant throughout each source and the extent of contaminant migration through each of the affected media will be documented. The Site characterization summary will provide EPA with a preliminary reference for developing the risk assessment, and evaluating the development and screening of remedial alternatives and the refinement and identification of ARARs.

Remedial Investigation (RI) Report (3.7.3)

Respondent will prepare and submit a draft RI report to EPA for review and approval after completion of the baseline risk assessment by EPA (see Task 4). This report shall summarize results of field activities to characterize the Site, remaining sources of contamination, nature and extent of contamination, the fate and transport of contaminants, and results of the baseline risk assessment. Respondent will

refer to the RI/FS Guidance for an outline of the report format and contents. Following comment by EPA, Respondent will prepare a final RI report which satisfactorily addresses all EPA comments.

TASK 4 - BASELINE RISK ASSESSMENT (3.4.2)

As set forth in the Order, EPA will perform a Baseline Risk Assessment which will identify and characterize the toxicity and levels of hazardous substances, contaminant fate and transport, the potential for human and/or environmental exposure, and the risk of potential impacts or threats on human health and the environment. This assessment will provide bases and justification for necessary remedial activity. Respondent shall incorporate the Baseline Risk Assessment reports generated by EPA into the RI Report.

TASK 5 - TREATABILITY STUDIES (RI/FS Manual, Chapter 5)

Unless Respondent can demonstrate to EPA satisfaction that they are not needed, treatability testing will be performed by Respondent to assist in the detailed analysis of alternatives. If applicable, testing results and operating conditions will be used in the detailed design of the selected remedial technology. Treatability testing includes the following activities:

a. Determination of Candidate Technologies and of the Need for Testing (5.2; 5.4)

Respondent will identify in a technical memorandum, subject to EPA review and approval, candidate technologies for a treatability studies program during project planning (Task 1). Candidate technologies will cover the range of technologies required for alternatives analysis (Task 6 a). The specific data requirements for the testing program will be determined and refined during Site characterization and the development and screening of remedial alternatives (Tasks 2 and 6, respectively).

Conduct literature survey and determine the need for treatability testing (5.2)

Respondent will conduct a literature survey to gather information on performance, relative costs, applicability, removal efficiencies, operation and maintenance (O&M) requirements, and implementability of candidate technologies. If practical candidate technologies have not been sufficiently demonstrated, or cannot be adequately evaluated for the Site on the basis of available information, treatability testing will be conducted. If EPA determines treatability testing is required, and unless the Respondent can demonstrate to EPA's satisfaction that they are not needed, Respondent will submit a statement of work to EPA outlining the steps and data

necessary to evaluate and initiate the treatability testing program.

Evaluate treatability studies (5.4)

Once a decision has been made to perform treatability studies, Respondent and EPA will decide on the type of treatability testing to use (e.g., bench versus pilot). Because of the time required to design, fabricate, and install pilot scale equipment as well as perform testing for various operating conditions, the decision to perform pilot testing should be made as early in the process as possible to minimize potential delays of the FS. To assure that a treatability testing program is completed on time, and with accurate results, Respondent will either submit a separate treatability testing work plan or an amendment to the original Site work plan for EPA review and approval.

b. Treatability testing and deliverables (5.5; 5.6; 5.8)

The required deliverables, in addition to the memorandum identifying candidate technologies, if treatability testing is conducted include: a work plan, a SAP, and a final treatability evaluation report. EPA may also require a treatability study health and safety plan, if appropriate.

Treatability testing work plan (5.5)

Respondent will prepare a treatability testing work plan or amendment to the original Site work plan for EPA review and approval describing the Site background, remedial technology(ies) to be tested, test objectives, experimental procedures, treatability conditions to be tested, measurements of performance, analytical methods, data management and analysis, health and safety, residual waste management, and DQO documentation. If pilot-scale treatability testing is to be performed, the pilot-scale work plan will describe pilot plant installation and start-up, pilot plant operation and maintenance procedures, operating conditions to be tested, a sampling plan to determine pilot plant performance, and a detailed health and safety plan. If testing is to be performed off-site, permitting requirements will be addressed.

Treatability study SAP (5.5)

If EPA determines that the original QAPP or FSP is not adequate for defining the activities to be performed during the treatability tests, a separate treatability study SAP or amendment to the original Site SAP will be prepared by Respondent for EPA review and approval. Task 1, item c., above, provides additional information on SAP requirements.

Treatability study health and safety plan (5.5)

If EPA determines that the original health and safety plan is not adequate for defining the activities to be performed during the treatability tests, a separate or amended health and safety plan will be developed by Respondent. Task 1, item c., above, provides additional information on health and safety plan requirements. EPA will review but will not "approve" the treatability study health and safety plan.

Treatability study evaluation report (5.6)

Following completion of treatability testing, Respondent will analyze and interpret the testing results in a technical report to EPA. Depending on the sequence of activities, this report may be a part of the RI/FS report or a separate deliverable. The report will evaluate each technology's effectiveness, implementability, cost and actual results as compared with predicted results. The report will also evaluate full-scale application of the technology, including a sensitivity analysis identifying the key parameters affecting full-scale operation.

TASK 6 - DEVELOPMENT AND SCREENING OF REMEDIAL ALTERNATIVES
(RI/FS Guidance, Chapter 4)

The development and screening of remedial alternatives is performed to develop an appropriate range of options to be evaluated. This range of alternatives should include as appropriate, options in which treatment is used to reduce the toxicity, mobility, or volume of hazardous substances or wastes, but varying in the types of treatment, the amount treated, and the manner in which long-term residuals or untreated hazardous substances or wastes are managed; options involving containment with little or no treatment; options involving both treatment and containment; and a no-action alternative. The following activities will be performed by Respondent as a function of the development and screening of remedial alternatives.

a. Development and Screening of Remedial Alternatives (4.2)

Concurrent with its RI Site characterization task, Respondent will begin to develop and evaluate a range of appropriate hazardous substance or waste management options which, at a minimum, ensure protection of human health and the environment.

Refine and document remedial action objectives (4.2.1)

Respondent will review, and if necessary, propose refinement to the Site-specific remedial action objectives that were established by EPA prior to negotiations between EPA and Respondent. The revised remedial action objectives will be

documented in a technical memorandum. These objectives will specify the contaminants and media of interest, exposure pathways and receptors, and an acceptable contaminant level or range of levels for each exposure route.

Develop general response actions (4.2.2)

Respondent will develop general response actions for each medium of interest defining containment, treatment, excavation, pumping, or other actions, singly or in combination, to satisfy the remedial action objectives.

Identify areas or volumes of media (4.2.3)

Respondent will identify areas or volumes of media to which general response actions may apply, taking into account the requirements for protectiveness identified in the remedial action objectives, and the chemical and physical characteristics of the Site.

Identify, screen, and document remedial technologies (4.2.4; 4.2.5)

Respondent will identify and evaluate technologies applicable to each general response action to eliminate those that cannot be implemented at the Site. General response actions will be refined to specify remedial technology types. Technology process options for each of the technology types will be identified either concurrent with, or immediately following the identification of technology types. Process options will be evaluated on the basis of effectiveness, implementability, and cost factors to select and retain one or, if necessary, more representative processes for each technology type. The technology types and process options will be summarized in a technical memorandum to be submitted to EPA for review and approval. The reasons for eliminating alternatives must be specified.

Assemble and document alternatives (4.2.6)

Respondent will assemble selected representative technologies into alternatives for each affected medium or operable unit. Together, all of the alternatives will represent a range of treatment and containment combinations that will address the Site as a whole. A summary of the assembled alternatives and their related action-specific ARARs will be included in a technical memorandum to be submitted to EPA for review and approval. The reasons for eliminating alternatives during the preliminary screening process must be specified.

Refine alternatives

Respondent will refine the remedial alternatives to identify contaminant volume addressed by each proposed process, and the sizing of critical unit operations, as necessary. Sufficient information will be collected for an adequate comparison of alternatives. Remedial action objectives for each medium will also be refined as necessary to incorporate any new risk assessment information being generated from the remedial investigation. Action-specific ARARs will be updated as remedial alternatives are refined.

Conduct and document screening evaluation of each alternative (4.3)

If necessary, Respondent will perform a final screening process based on short and long term aspects of effectiveness, implementability, and relative cost. Generally, this screening process is only necessary when there are many feasible alternatives available for detailed analysis. If required, the screening of alternatives will be conducted to assure that only the alternatives with the most favorable composite evaluation of all factors are retained for further analysis.

As appropriate, the screening will preserve the range of treatment and containment alternatives initially developed. The range of remaining alternatives will include options that use treatment technologies and permanent solutions to the maximum extent practicable. Respondent will prepare a technical memorandum summarizing the results and reasoning employed in screening, arraying alternatives that remain after screening, and identifying the action-specific ARARs for the remaining alternatives.

b. Alternatives Development and Screening Deliverables (4.5)

Respondent will prepare a technical memorandum summarizing the work performed and the results of each task above, including an alternatives array summary. These alternatives will be modified by Respondent if required by EPA to assure identification of a complete and appropriate range of viable alternatives for detailed analysis. This deliverable will document the methods, rationale, and results of the alternatives screening process.

TASK 7 - DETAILED ANALYSIS OF REMEDIAL ALTERNATIVES
(RI/FS Guidance, Chapter 6)

A detailed analysis will be conducted by Respondent to provide EPA with sufficient information for the selection of a Site remedy. This analysis is Respondent's final FS task.

a. Detailed analysis of alternatives (6.2)

Respondent will conduct a detailed analysis of alternatives consisting of an analysis of each option against a set of nine (9) evaluation criteria, and a comparative analysis of all options using the same evaluation criteria.

Apply nine (9) criteria and document analysis (6.2.1 - 6.2.4)

Respondent will apply nine (9) evaluation criteria to the assembled remedial alternatives to ensure that the selected remedial alternative will be protective of human health and the environment; will be in compliance with, or include a waiver of, ARARs; will be cost-effective; will utilize permanent solutions and alternative treatment technologies, or resource recovery technologies, to the maximum extent practicable; and will address the statutory preference for treatment as a principal element. The evaluation criteria include: (1) overall protection of human health and the environment; (2) compliance with ARARs; (3) long-term effectiveness and permanence; (4) reduction of toxicity, mobility, or volume; (5) short-term effectiveness; (6) implementability; (7) cost; (8) state (or support agency) acceptance; and (9) community acceptance. (Note: criteria 8 and 9 are considered after the RI/FS report has been released to the general public.) For each alternative, Respondent should provide: (1) a description of the alternative which outlines the hazardous substance or waste management strategy involved and identifies the key ARARs, and (2) a discussion of the individual criterion assessment. If Respondent does not have direct input on criteria 8 (state or support agency acceptance) and 9 (community acceptance), these will be addressed by EPA.

Compare alternatives against each other and document the comparison of alternatives (6.2.5; 6.2.6)

Respondent will perform a comparative analysis between the remedial alternatives comparing each alternative against the others using the evaluation criteria. EPA will identify and select the preferred alternative. Respondent will prepare a technical memorandum summarizing the results of the comparative analysis.

b. Detailed Analysis Deliverables (6.5)

In addition to the technical memorandum summarizing the results of the comparative analysis, Respondent will submit a draft FS report to EPA for review and approval. After all EPA comments have been addressed by Respondent to EPA satisfaction, the final FS report will be bound with the final RI report.

Feasibility study report (6.5)

Respondent will prepare a draft FS report for EPA review and comment. This report, as ultimately adopted or amended by EPA, provides a basis for remedy selection by EPA and documents the development and analysis of remedial alternatives. Respondent will refer to the RI/FS guidance for an outline of the report format and the required report content. Respondent will prepare a final FS report which satisfactorily addresses all EPA comments.

REFERENCES FOR CITATION

The following list, although not comprehensive, comprises many of the regulations and guidance documents that apply to the RI/FS process:

The NCP, as amended, 40 C.F.R. Part 300 (March 8, 1990)

"Guidance for Conducting Remedial investigations and Feasibility Studies under CERCLA," U.S. EPA, Office of Emergency and Remedial Response, October 1988, OSWER Directive No. 9355.3-01.

"Interim Guidance on Potentially Responsible Party Participation in remedial Investigation and Feasibility Studies," U.S. EPA, Office of Waste Programs Enforcement, Appendix A to OSWER directive No. 9355.3-01.

"Guidance on Oversight of Potentially responsible Party Remedial Investigations and Feasibility Studies," U.S. EPA, Office of Waste Programs Enforcement, (forthcoming), OSWER Directive No. 9835.3.

"A Compendium of Superfund Field operations Methods," two volumes, u.S. Epa, Office of Emergency and Remedial Response, EPA/540/p-87/001-A, August 1987, OSWER Directive No. 9355.0-14.

"EPA NEIC Policies and Procedures Manual," May 1978, revised November 1984, EPA-330/9-78-001-R.
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